

What is claimed is:

1. A process of producing an aluminum material having an aluminum nitride (AlN) region on the surface thereof, comprising the steps of:
preparing an aluminum material containing CuAl_2 ; and
plasma nitriding the aluminum material, to thereby form an AlN region on the surface of the aluminum material.
2. The process according to Claim 1, further comprising a step of sputtering the aluminum material to remove Al_2O_3 present on the surface of the aluminum material prior to the plasma nitriding step.
3. The process according to Claim 1 or 2, wherein the plasma nitriding step is carried out at -167 to 630°C .
4. The process according to any one of Claims 1 to 3, wherein the plasma nitriding step comprises a treating step which consists of a step of applying a pulse voltage of -50 V to -50 kV for $0.1\ \mu\text{s}$ to 10 ms followed by an application suspending step having $0.1\ \mu\text{s}$ to 100 ms; or a treating step which comprises a step of applying a continuous D.C. voltage of -50 to -800 V, in an activated first nitriding gas atmosphere.
5. The process according to Claim 4, wherein the first nitriding gas is a gas made from nitrogen and hydrogen and/or a gas comprising nitrogen gas and hydrogen gas.
6. The process according to any one of Claims 1 to 5, wherein AlN is produced at a rate of $0.05\ \mu\text{m}/\text{hour}$ or more in the plasma nitriding step.
7. The process according to any one of Claims 2 to 6, wherein the sputtering step is carried out using the aluminum material as the negative electrode by applying a D.C. voltage of -50 V to -4000 V in an atmosphere of chemically activated second nitriding gas.
8. The process according to any one of Claims 1 to 7, wherein CuAl_2 is contained in the AlN region of the obtained aluminum material.

9. An aluminum material having an AlN region on the surface thereof, wherein the AlN region has CuAl₂.
10. An aluminum material having an AlN region on the surface thereof, wherein CuAl₂ is finely dispersed in the AlN region.
11. The material according to Claim 9 or 10, wherein the AlN region has a thickness of 0.1 μm or more.
12. The material according to any one of Claims 9 to 11, wherein the AlN region is grown at a rate of 0.05 μm/hour or more.
13. The material according to any one of Claims 9 to 12, wherein the AlN region has a Vickers hardness (Hv) of 4 GPa or more.
14. The material according to any one of Claims 9 to 13, wherein the AlN region has a thermal conductivity of 100 W/mK or more.
15. The material according to any one of Claims 9 to 14, wherein the tensile fracture strength between the AlN region and the aluminum material is not less than the tensile fracture strength of the aluminum material and is 15 GPa or less.